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THE IMPACT OF TECHNOLOGY ON EMERGENT LEADERSHIP BEHAVIORS AND PERCEPTIONS IN SRI LANKA

Completed Research Paper

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Abstract

Organizations are increasingly making use of technology to facilitate collaboration and communication within teams. Such computer-mediated work arrangements are not limited by geography and often require new work practices including more proactive individual participation – or emergent leadership. While emergent leadership has been studied extensively in North America, much less work has been done in other cultures. In this paper we report the findings from a longitudinal study of emergent leadership behavior in computer-supported project teams in Sri Lanka with special attention paid to the role of gender. Also, the relationship between actual leadership behaviors and leadership perceptions is investigated. Similar to North American studies we found that technology helped level the playing field for women enabling them to engage in emergent leadership behavior. Further, women engaging in both task- and socially-oriented leadership behaviors were positively perceived by team mates.

Keywords: Emergent leadership, computer-mediated communication, gender

Introduction

Leadership is a necessary element in groups; it can help guide behaviors in pursuit of common goals (Hoyt and Blascovich, 2003). As organizational teams have more and more technology support for their communication and collaboration, the way behavior is guided or influence exerted is likely changing too. Researchers have labeled this new form of leadership e-leadership – defined as a social influence process mediated by technology to produce a change in group attitudes, feelings, thinking, behaviors, and/or performance (Avolio et al. 2001)). E-leadership may come from any hierarchical level, be associated with an individual or shared by a group, and its locus may change over time– consistent with characterizations of emergent leadership behaviors.

While a number of antecedents and consequences of leadership in co-located teams have been identified in the literature, successful e-leadership is likely different (Bell and Kozlowski, 2002). For instance, successful e-leaders are likely to coach (O’Connell et al, 2002) or facilitate (Cascio, 1999) rather than direct team members’ behavior. These styles may be more successful because virtual team leaders often have no choice but to distribute and delegate leadership functions and responsibilities to team members (Bell and Kozlowski, 2002). Taking such a facilitative approach to leadership means individuals in technology-supported teams must take individual responsibility for meeting team goals – i.e., they must engage in emergent leadership behaviors.

An individual’s willingness to engage in emergent leadership behavior is at least partly driven by role expectations. Gender role theory (Eagly et al. 2000) suggests individuals occupy roles in their organizations and workgroups defined by their position in a formal hierarchy (i.e., assigned leadership role) but are simultaneously constrained by their gender role (Eagly and Johannesen-Schmidt, 2001). As such, men and women who occupy similar positions in an organizational hierarchy behave in similar ways as dictated by their occupational roles; however, gender provides an implicit background identity (Ridgeway, 1997) that can lead men and women who occupy the same occupational role to behave somewhat differently (Eagly and Johannesen-Schmidt, 2001). For example, women may exercise leadership through a more interpersonally-oriented leadership style while men may use a more task-oriented style (Eagly and Johnson, 1990). Further, in the context of role theory, roles are socially shared (Biddle, 1979) meaning that a further distinction can be made between internalized roles that drive behaviors and the external expectations that color our perceptions of such behaviors. For example, previous research suggests a man’s chance of being perceived as a leader in a collocated group is greater than a woman’s due to team members’ socially-derived perceptions of incongruity between expected leadership behaviors and female gender roles (Eagly and Karau, 1991). However, computer-mediated communication (CMC) can serve to level the playing field for women potentially increasing their opportunities to also emerge as leaders (Klein and Dologite, 2000).

Time is an important consideration when studying gender and leadership in CMC teams for three reasons. First, leadership takes time to develop (Van Dierendonck et al. 2004). Second, behaviors attributable to demographic differences within a team may dissipate over time (Harrison et al. 2002) thus any differences in leadership behavior between men and women may disappear with prolonged interaction (Eagly and Karau, 1991). Third, and finally, relational development takes longer to emerge in CMC contexts compared to face-to-face contexts (Chidambaram, 1996) suggesting the willingness of team members to engage in extra-role behaviors such as emergent leadership may take longer to surface.

Integrating social-role theory and expectation-confirmation theory, we investigate the relationship between actual leadership behaviors shown by people, and their chances of being perceived as leaders in technology-mediated teams, and whether there is a gender difference in this relationship. We conducted a longitudinal experiment utilizing MBA students at the Post-Graduate Institute of Management in Colombo, Sri Lanka. These students participated in technology-supported teams tasked with phased deliverables. Yahoo!Groups was the collaborative technology used to support team interactions and all messages were captured for analysis. Findings are presented focused on developing a better understanding of leadership emergence in the CMC context and the extent to which gender role theory holds in technology-mediated environments.

Literature Review

Leadership as a behavior

It is possible to view leadership as a set of relatively stable and enduring traits distributed to some in a population or as a set of observable behaviors enacted by those who direct and coordinate group activities (Jago, 1982). Studying the former can produce rich description of leadership traits, but studying the latter can produce actionable prescriptions about developing leadership potential. Focusing on leadership behaviors, the theory of behavioral

complexity in leadership (BCL) (Hooijberg and Quinn, 1992; Denison et al.1995; Hooijberg, 1996) posits that people who are perceived as effective leaders are those who can engage in behavioral differentiation – selectively engaging in behaviors drawn from a broad behavioral repertoire based on the needs of the situation at hand (Hooijberg, 1996). Further, Denison et al. (1995) used Quinn’s (1984) competing values framework as a method for classifying the behaviors in a leader’s repertoire. The original set of eight behaviors (i.e., broker, innovator, director, producer, monitor, facilitator, coordinator, and mentor) has more recently been factor analyzed into two dimensions: people- or socially-oriented (innovator, facilitator, mentor), and task-oriented (broker, director, producer, monitor, coordinator) (Vilkanis and Cartan, 2006). While BCL and the competing values framework were conceived of for use in traditional face-to-face leadership settings, they have also been applied to the context of technology-mediated teams in recent years (Carte et al. 2006).

Task-oriented and socially-oriented leadership behaviors were first introduced by Bales (1950) and developed in the Ohio State studies on leadership (Hemphill and Coons, 1957). In these studies, task-oriented leadership – labeled initiation of structure – included behaviors such as encouraging subordinates to follow rules and procedures, maintaining high standards for performance, and making leader and subordinate roles explicit. Socially-oriented leadership – labeled consideration – included behavior such as helping and doing favors for subordinates, looking out for their welfare, explaining procedures, and being friendly and available (Eagly and Johannesen-Schmidt, 2001).

Leadership Behaviors and Gender

Gender role theory argues that leaders’ behaviors are influenced by their specific positions in a hierarchy and the constraints of their gender roles – the shared beliefs that apply to individuals on the basis of their gender. As such, gender roles influence leader behaviors both: 1) because people react to leaders in terms of gender expectancies and 2) because most people have internalized gender roles to some extent and behave accordingly (Wood et al. 1997). Generally gender roles include an expectation that men are more self-assertive and motivated to master their environment (e.g., more aggressive, independent, self-sufficient, forceful, and dominant), while women are more selfless and concerned with others (e.g., more kind, helpful, understanding, warm, sympathetic, and aware of others’ feelings). These role expectations likely color the perceptions we have of others, but may contribute to the expectations men and women have for their own behaviors in organizational settings (Ely, 1995). Finally, female leaders potentially experience more conflict between their gender role and leader role (Eagly and Karau, 2002). Empirical evidence supports gender role theory. Eagly and Johnson’s (1990) meta-analytic review found men and women engage in leadership behaviors according to role expectations – women lead in a more interpersonally-oriented leadership style and men lead in a more task-oriented style. Further, women leaders reported themselves as more likely to encourage participation, share power and information, enhance the self-worth of others, and energize followers while men described their style as a series of transactions with subordinates (Rosener, 1990).

While men and women might engage in different leadership behaviors, do their teammates notice those behaviors and provide some level of followership? In general, gender role theory predicts that men are perceived to emerge in initially-leaderless groups more often than women because task leadership (a behavior more likely exhibited by men) is more often associated with emergence as a leader and meta-analytic findings support this assertion particularly in short-term groups or groups whose task does not require complex social interactions (Eagly and Karau, 1991). Implicit in this argument is that men actually engage in more task behavior, as opposed to followers simply paying more attention to task leadership exhibited by male members. Behavior is an important baseline measure of leader effectiveness, but it is also important that followers accurately recognize or perceive who among them is leading (or should be followed). However, behavior and perceptions are clearly related (i.e., men and women engage in behaviors at least partly based on what they perceive others expect, and others’ perceptions are based at least in part on observed behaviors). In an attempt to unravel this interplay, we turn to expectation-confirmation/disconfirmation theory (ECT).

ECT, which is popular for measuring customer satisfaction in marketing, suggests that a consumer’s perceptions about a product are a function of to what extent their expectations about it are confirmed. Gender-role theory argues followers expect women to engage in socially-oriented leadership behaviors and men to engage in task leadership. As such, ECT provides guidance on how male and female leaders might be perceived based whether this expectation is confirmed or disconfirmed (illustrated in Table 1). There are four perspectives about ECT: assimilation (dissonance theory), contrast theory, generalized negativity thesis, and assimilation-contrast theory.

Assimilation theory (Sherif and Hovland, 1961) and dissonance theory (Festinger, 1957) argue that any discrepancy between expectation and performance would be minimized or assimilated by consumers adjusting their perceptions

to be more consistent with expectations. This perspective suggests that disconfirmation either positive (i.e., socially-oriented leadership from men or task-oriented leadership behaviors from women) or negative (i.e., lack of task-oriented leadership behaviors from men or lack of socially-oriented leadership behaviors from women) may simply go unnoticed. Alternatively, contrast theory (Sherif and Hovland, 1961) suggests outcomes deviating from expectations cause the subject to favorably or unfavorably react to the disconfirmation experience in that a negative disconfirmation is believed to result in a poor evaluation whereas a positive disconfirmation would cause the product to be highly appraised. In our contexts this suggests that followers would react negatively to women or men not engaging in the expected behavior (i.e., women not engaging in socially-oriented leadership or men not engaging in task-oriented leadership), but they would positively react to either gender engaging in both socially- and task-oriented leadership. Such combinations of behaviors can serve to confirm expected behaviors as well as provide positive disconfirmation.

Table 1: ECT, Leadership and Gender proposed outcomes

	Task-oriented leadership		Socially-oriented leadership	
	Women	Men	Women	Men
Confirmation	<i>lower</i>	<i>higher</i>	<i>higher</i>	<i>lower</i>
Disconfirmation	<i>higher</i>	<i>lower</i>	<i>lower</i>	<i>higher</i>

The generalized negativity thesis is that any discrepancy between results and expectations will result in a generalized negative hedonic state, causing the product to receive a lower rating than if it had met expectation. Interestingly, even if the product’s performance exceeds customers’ expectations, it will be less satisfying than its objective performance would justify. Assimilation-contrast approach combines assimilation theory and contrast theory. It assumes that there are zones or latitudes of acceptance or rejection in customers’ perceptions, whether assimilation or contrast effects develop is a function of the relative disparity. If the disparity between expectations and product performances is small, and falls into the customers’ zone of acceptance, customers will assimilate the difference by rating the product in line with expectations. However, if the disparity is large and falls into the zone of rejection, then a contrast effect comes into play, and magnifies the perceived disparity between expectations and product performance.

There is some empirical support for the generalized negativity thesis. For example, Carlsmith and Aronson (1963) studied bitter and sweet solutions and found that when the sweet solution was expected and the bitter solution tasted, a disconfirmation resulted in a rating of more bitter, which is consistent with contrast theory. On the other hand, when the bitter solution was expected but the sweet solution came up; the disconfirmation resulted in a rating of less sweet, which is consistent with assimilation theory. Carlsmith and Aronson explained the results by arguing that any disconfirmation (negative or positive) results in a negative state. Hovland et al. (1957) found support for assimilation-contrast theory: product performance differing only slightly from one’s expectation tended to result in adjusting product perceptions toward expectations (assimilation theory), while large differences between expectations and actual product performance tended to be exaggerated (contrast theory).

While not specifically applying ECT, we did find some support for the theoretical conclusions in the gender role literature. Heilman and Chen (2005) found that engaging in altruistic citizenship behavior, which is supposed to be part of women’s gender role, will enhance men’s performance evaluations and reward recommendations but will not affect those of women, and withholding altruistic citizenship behavior will be detrimental to women’s performance evaluations and reward recommendations but will not affect those of men. The logic behind their argument is consistent with contrast theory: because altruistic citizenship behavior is expected from women when it occurs it is not apt to be regarded as particularly noteworthy and is more likely to be disregarded or ignored; on the other hand, men are not expected to show altruistic behavior, so when they actually show it, they are more likely to stand out and be noticed.

Technology-mediated Group, Gender Differences, Leadership Behaviors and Perceptions

Leadership within technology-mediated teams can emerge and be perceived by teammates through a number of behaviors. Some researchers have suggested specific roles are important – i.e., initiator, scheduler and integrator

(Yoo and Alavi, 2004). Further, general behaviors like posting more messages (Yoo and Alavi, 2004) or being among the first to post a message to the team (Weisband, 1992) may lead teammates' to perceive someone has having led. Recently researchers surveyed 419 international professionals within one organization asking respondents to indicate the relative importance of task-oriented and socially-oriented leadership behaviors in virtual versus face-to-face teams. While the magnitude of differences in their response was small¹, respondents perceived both task-oriented and socially-oriented leadership behaviors to be more important in virtual compared to face-to-face team interactions (Zimmermann et al., 2008). However, team members must notice such behaviors, and virtual team members' perceptions of who among them emerged as a team leader have been more strongly associated with task-oriented behaviors (Sarker et al., 2009; Yoo and Alavi, 2004). A greater emphasis on task leadership could work to the advantage of male team members, unless men and women behavior differently in the technology-mediated context compared to face-to-face environments.

Technology can serve to minimize inequalities between group members and lead to more equal levels of influence than those that occur in face-to-face teams (Kiesler et al., 1984; Siegel et al., 1986; Sproull and Kiesler 1986; Dubrovsky et al., 1991; Wei et al., 1998). Two main explanations for equalization are: first, social cues often available in face-to-face interactions are dampened by technology (Nunamaker et al., 1988; Sproull and Kiesler 1992; Hollingshead 1996; Dennis et al., 1998) and second, technology provides parallel processing eliminating turn taking. Collaborative technologies (CT) offer capabilities such as visual anonymity and equality of participation both labeled reductive capabilities – capabilities that reduce normal communication patterns (Carte and Chidambaram, 2004). Visual anonymity results from CT providing the opportunity to engage with teammates with reduced or potentially eliminated face-to-face meetings. Without meeting, group members may be unaware of the gender of teammates. Anonymity potentially reduces evaluation apprehension (Reinig and Shin, 2002). Thus organizational members are less aware of status differences and feel less inhibited about contributing information and sharing ideas. Equality of participation can also result from the reduced need for turn-taking (unlike verbal channels, individuals may engage in online communication simultaneously). The opportunity for simultaneous input makes it easier for all members to contribute (Dennis et al., 1998; Tan et al., 1998; Tan et al., 1999; Kelsey 2000).

Previous studies of collocated groups suggest men tend to have higher participation rates than women in groups (e.g., Carli, 1982). Within the CMC context, greater equality of participation among high-status and low-status members have been reported (Bordia, 1997). Further, compared to men, women in technology-supported teams perceived their teams as more inclusive and supportive (Lind 1999). This may in part be because individuals in face-to-face groups pay more attention to in-group/out-group differences in terms of gender than those in technology-supported groups (Bhappu et al. 1997). As such, we argue that collaborative technologies may serve to level the playing field by reducing inhibitions about appropriate behavior thus allowing women to engage in more task-oriented leadership behaviors and less socially-oriented leadership behaviors. Therefore, we hypothesize:

H1: In technology-supported groups, there will be no difference in the task-oriented and socially-oriented leadership behaviors engaged in by men and women

However, while visual anonymity and equality of participation may level the playing field in terms of behaviors, in most cases groups do not maintain visual anonymity (i.e., some face-to-face meetings take place either formally or informally) resulting in team members having awareness of the gender of teammates. ECT and gender role theory both suggest that once gender is known, individuals develop expectations about role-congruent leadership behaviors. According to contrast theory, we hypothesize:

H2a: Compared with women, men who show socially-oriented leadership behavior will be more likely to be perceived as leaders in technology-supported groups

H2b: Compared with men, women who show task-oriented leadership behavior will be more likely to be perceived as leaders in technology-supported groups

Finally, gender role theory argues that gender differences are most salient early in a group's life (Eagly and Karua, 1991). As groups interact, individuals develop more detailed information about teammates' knowledge and abilities and perceptions are less driven by surface-level (or visual) characteristics. As such:

H3: The relationship between gender, leadership behavior, and perceptions will dissipate over time.

¹ An example item: how important is it for you that your manager set clear tasks for team members resulted in an average rating of 4.14 (where 1= not important and 5=very important) for face-to-face interactions and 4.21 for virtual team interactions.

Leadership, Gender and Culture

House's cross-cultural leadership theory asserts that expected, accepted and effective leader behavior varies by cultures. According to this theory, the importance placed on, and effectiveness of, socially- and task-oriented leader behaviors are contingent on the culturally endorsed implicit theories of leadership (CILTs) of the broader social system (House et al. 1997). One of the more well-known culture dimension frameworks is Hofstede's culture dimensions: power distance, individualism vs. collectivism, masculinity vs. femininity, uncertainty avoidance, and long vs. short term orientation (Hofstede, 1980). High power distance and uncertainty avoidance create resistance to empowerment and self-managed teams; collectivism facilitates empowerment as does the nurturing dimension (Randolph and Sashkin, 2002). However, more nurturing cultures can lead to a greater focus on team development and not enough on team performance. A review of leadership literature shows there is a lack of research about the interaction of gender and culture. It is possible gender differences are salient in one culture but not that salient in another.

In a notable exception, one recent study focused on gender, leadership, and culture in 42 countries (Van Emmerik et al. 2008). These authors hypothesized that culture was a more significant driver of leadership behavior than gender. Their results were consistent with previous findings on socially-oriented leadership – women engaged in more of it. However, they also found women engaged in more initiating structure (i.e., task-oriented leadership) contradicting classical stereotypes regarding men and women. They concluded that gender differences in leadership behaviors may be predominantly present in western cultures. However, they used Likert-type items to capture subordinate perceptions of socially-oriented and task-oriented leadership behaviors on the part of their superiors. As such, the results, while a useful first step, muddle together behavior and perception. While our study does not include cross-cultural data (as such we do not develop cross-cultural hypotheses), existing work provides little guidance from which to derive hypotheses. We will return to the role of culture in our discussion.

Methods

Subjects in our study were 132 students (male=85, female=47) in the first semester of a premier MBA program in Sri Lanka. This institution attracts high-quality, experienced managers from many regional and international organizations into its MBA program and all courses are taught in the evening so that students may maintain their fulltime employment while completing their MBA. As such, the use of these students does not come with some of the usual concerns about using students as surrogates – i.e., these were experienced managers engaging in leadership behaviors. All subjects were randomly assigned into 25 groups; 18 five-member groups and 7 six-member groups. Over the duration of their Introduction to MIS course, the groups were asked to complete 4 case assignments over 8 weeks with the deliverables equally spaced two-weeks apart. An initial survey was administered to collect demographic data. While the participants were not asked whether they knew any of their teammates, their newness to the MBA program as well as the random assignment to teams likely reduced or eliminated any group history. A final survey was conducted to capture leadership perceptions.

Previous research suggests the assigned task may serve to make gender more or less salient (i.e., some tasks are more feminine and some more masculine). The participants in this study engaged writing 4 case notes. For example, they were asked to read an article in MIS Quarterly Executive (Carte et al. 2005) and respond to four questions. Writing assignments were commonly made within this MBA program and such assignments were unlikely to be perceived as either masculine or feminine.

Research Procedures

While these teams were colocated, they were asked to complete the assignment using only Yahoo!Groups, a commercially available Web-based groupware tool, for communicating with each other and posting project deliverables. Each team had a shared workspace in Yahoo!Groups, similar to a discussion board, which was accessible only to those team members and the instructor as well as a space for sharing files. A survey was administered to capture the extent to which the task was completed virtually. The responses indicated that the groups used Yahoo!Groups for the majority of their interactions,² consistent with current characterizations of virtual teams

² The participants were asked what percentage of their team's interactions occurred using phone calls, face-to-face meetings, and/or impromptu meetings. Respondents indicated that their teams used these alternative channels for less than 10% of their interactions and more than 90% of interactions took place over *Yahoo!Groups*.

that move away from purely virtual or purely collocated instead focusing on degrees of virtualness. Griffith and colleagues (2002) referred to this configuration as a hybrid team or group.

Leadership behaviors: Our measures of task-oriented or socially-oriented leadership behavior were coded from email exchanges. The communication exchanges on Yahoo!Groups were archived and downloaded for coding. Messages exchanged were read and incidents of leader behaviors were identified within each message. Thus, the coding unit of analysis was an incident of actual leadership behavior within each message (as such a particular message could contain multiple behaviors). In all, 2742 messages were exchanged and subsequently coded.

The Leaderplex model (see Figure 1) was used to guide our coding because previous work has been done to develop a coding scheme along these eight dimensions (see Carte et al. 2006). Following the previous work on a two-factor solution and coding guidance for the eight behaviors, we coded behaviors engaged in by our participants as socially-oriented if they demonstrated properties of facilitating, mentoring, or innovating, and we coded them as task-oriented if they demonstrated properties of brokering, producing, directing, coordinating, or monitoring. Our data analysis was conducted at the individual level. Coding was conducted by two coders and interrater agreement was above .80. The two variables used in our analysis, task-oriented leadership and socially-oriented leadership, are the total number of leadership behaviors each individual engaged in within each category (i.e., task or social) within each of the four time periods between each deliverable.

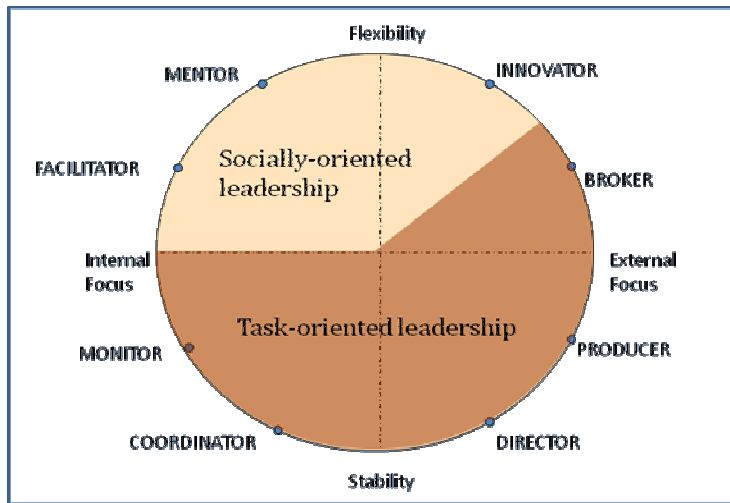


Figure 1: Leaderplex Model based on Behavioral Complexity in Leadership (BCL)
 Source: Adapted from Denison, Hooijberg, and Quinn, 1995

Leadership perceptions: Finally, after the fourth deliverable, participants were asked which member(s) of their team they thought emerged as leaders. Specifically, they were asked: How would you describe the leadership within your group for this assignment? 1. This group had no leadership 2. All members equally led this group, or 3. One or more members stepped forward and took the lead, if so who (please give full names.). The number of times each participant was named as a leader was then counted (the result could vary from 0-5 or 6 because individuals could name themselves).

Controls: Two control variables were included in our analysis: the gender composition of the team, and personality. According to Kanter (1977), the relative proportion of men and women in a group is a critical determinant of behavior, we defined gender composition as the proportion of men in the remaining team members (i.e., a low number indicate fewer men in the remaining team, high numbers indicate more male teammates). Further, personality has been well studied as a correlate to effective leadership behavior (Judge et al. 2002). In order to rule out personality differences as an alternative explanation for our findings, we captured personality using the Big 5 personality items and used this data as a control in our analysis.

Data Analysis and Results

Hypothesis 1 examines indicators of observed leadership behavior. To test this hypothesis, we use leadership behavior (task- and socially-oriented) as the dependent variables, gender and time as independent variables, and

controlled for gender composition and personality. Data for the study were collected on the same individuals over four equally spaced time periods yielding a repeated measures generalized linear model (GLZ) analysis. GLZ is a flexible generalization of ordinary least squares regression that is particularly appropriate for count or categorical dependent data. The dependent variables in our study were counts (the number of leadership behaviors shown in each period). The Poisson distribution is widely used to represent count data in GLZ provided the variance and mean of the distribution are equal. When the variance is substantially larger than the mean, as in our sample, the data are said to be over-dispersed. The two-parameter negative binomial distribution – instead of the one parameter Poisson distribution – is the preferred alternative for an over-dispersion problem. We confirmed the appropriateness of the negative binomial model by plotting the projected negative binomial frequencies generated by a theoretical process with mean and dispersion matching our base model (model with no independent variables) and found general agreement. We also checked for zero inflation (too many zeros) by comparing the percentage of zeros in the observed responses with the percentage expected from the negative binomial distribution and found no evidence of zero-inflation.

In our analysis, we compared four nested models. These were model 1: a base model (model with no independent variables); model 2: model 1 plus personality variables and gender composition; model 3: model 2 plus gender and time, and model 4: model 3 plus the interaction of gender with time. These models are fully nested so that the difference in chi-square values provides a valid model comparison. Results appear in Table 2 and Table 3.

Table 2: Nested Model Comparisons for Task-Oriented Leadership Behaviors

	Model 1: Base Model	Model 2: + Personality and Group Composition	Model 3: + Gender and Time	Model 4: + Time Interaction
Chi-square	512.143	496.6350	473.2923	469.4064
Difference in Chi-square	...	15.508	23.3427	3.8859
Degree of freedom	479	473	471	470
Difference in degree of freedom	...	6	2	1
p-value	...	0.016653068*	<0.001***	0.0486931

Table 3: Nested Model Comparisons for Socially-Oriented Leadership Behaviors

	Model 1: Base Model	Model 2: + Personality and Group Composition	Model 3: + Gender and Time	Model 4: + Time Interaction
Chi-square	469.563	456.6204	432.7736	433.6411
Difference in Chi-square	..	12.9429	23.8468	-0.8675
Degree of freedom	479	473	471	470
Difference in degree of freedom	...	6	2	1
p-value	...	0.043952*	<0.001***	NA

Table 2 results indicate that a model including control variables, gender and time is a significant improvement over the simpler models, and the model including the interaction between gender and time was also significant. For socially-oriented leadership, Table 3 shows that personality and gender composition of the team are significant and there are significant main effects for time and gender. However, adding the interaction of gender and time provided no improvement.

Table 4 and Table 5 below show the coefficients of the generalized linear model for task-oriented and socially-oriented leadership behaviors. The generalized linear model estimates the expected number of leadership behaviors for an individual with the observed characteristics. Positive coefficients indicate a likelihood of an increased expected number of behaviors. Both Table 4 and Table 5 show that while model 3 produces significant improvements over model 2, there is no significant main effect for gender, thus hypothesize 1 (albeit a null hypothesis) is supported. Also, both show a negative coefficient for time in the main effects model, indicating that there is a tendency for people to engage in fewer leadership behaviors as time increases. Both tables also show

significant positive coefficients for conscientiousness, suggesting that significant positive scores lead to an increased expected number of behaviors. The results for the final column (adding a time and gender interaction) in Table 4 suggest that men and women differed in their task-oriented leadership behaviors and these differences vary over time. Table 5 presents interaction results for socially-oriented leadership behaviors for informational purposes only, because the model was not a significant improvement over the models without interaction.

Table 4: Influence of Dependent Factors on Task Oriented Leadership Behaviors

	Base Model	+ Personality and Group Composition	+ Gender and Time	+ Time Interaction
Gender		-0.019	0.0731	0.0762
Gender			-0.194	0.372
Time			-0.301***	-0.155*
Gender*time				-0.237**
Agreeableness		0.127	0.1073	0.1057
Conscientiousness		0.2445**	0.2406**	0.2423**
Extraversion		-0.07	-0.095	-0.09
Neuroticism		0.1325*	0.0906	0.0986†
Openness		-0.146	-0.148	-0.138

Table 5: Influence of Dependent Factors on Socially Oriented Leadership Behaviors

	Base Model	+ Personality and Group Composition	+ Gender and Time	+ Time Interaction
Gender		0.3783	0.5079†	0.5158†
Gender			-0.22	0.3264
Time			-0.385***	-0.234*
Gender*Time				-0.245
Agreeableness		-0.099	-0.126	-0.116
Conscientiousness		0.4018**	0.3694*	0.3696*
Extraversion		-0.138	-0.164	-0.162
Neuroticism		0.1244	0.0713	0.0722
Openness		-0.118	-0.116	-0.109

Hypotheses 2a and 2b examine leadership perceptions. To test these hypotheses, we used binomial logistic regression. In GLZ, we used gender composition and big-five personality as control variables; independent variables included the main effect of gender, socially-oriented leadership behavior, task-oriented leadership behavior, and the interaction of gender and socially/task-oriented leadership behavior.

The dependent variable for this set of hypotheses was the number of times an individual was named as a leader in the survey. These scores ranged from 0 to 5 for each individual. We combined all individuals who received any leadership comments into a single category since most individuals did not receive any. The resulting generalized linear analysis compares the probabilities of >0 indicators to the base class of 0 observation. Thus positive regression coefficients indicate an increased probability of the base class. That is, positive coefficients indicate a correlation with fewer perceived leadership behaviors. The results are presented in Table 6. For example, the negative (and significant) coefficients for task-oriented leadership behaviors is properly interpreted to mean that greater numbers of task-oriented leadership behaviors in time 1 and time 4 were correlated with a greater likelihood of being perceived as a leader. Interestingly, socially-oriented leadership behaviors in time 1 were also correlated (marginally significant) with leadership perceptions.

Table 6: GLZ coefficients for perceived leadership and actual leadership behaviors

	Time 1	Time2	Time3	Time4
Gender Composition	-1.717	-2.546	-0.122	-0.887
Gender (male =0, female =1)	0.1793	-0.407	0.3816	-0.093
agreeableness	0.3854	-0.629	-0.548	-0.482
conscientiousness	-0.114	-0.826	-0.37	-0.04
extraversion	-0.15	-0.241	-0.488	-0.431
neuroticism	0.5099	-0.378	-0.736**	-0.33
openness	-0.624	0.3453	0.3995	-0.035
Socially-oriented leadership behaviors	-0.552†	-0.362	-0.586	-0.667
Task-oriented leadership behaviors	-0.275*	-0.17	-0.264	-0.673*
Gender*Socially-oriented leadership	1.4276*	-0.706	-0.217	0.8767
Gender*Task-oriented leadership	-0.62†	0.5591	0.1756	0.2232

The results for socially-oriented/task-oriented leadership are based on the referent group (male), and results for gender*socially/task-oriented leadership tell us the differences between female groups and the male referent group. At Time 1, the positive coefficients for gender*socially-oriented leadership indicate that men who showed equal numbers of socially-oriented leadership behaviors compared to women were more likely than their female counterparts to be perceived as leaders confirming hypothesis 2a. Alternatively, the negative results for gender*task-oriented leadership (significant at $p=.055$) indicate that women who showed equal numbers of task-oriented leadership behaviors compared to men were more likely than their male counterparts to be perceived as leaders confirming hypothesis 2b. The influence of gender and leadership behaviors on perceived leadership disappeared in Time 2 and 3, and in Time 4 confirming hypothesis 3.

Discussion

The broad categorization of leadership behaviors as task-oriented or socially-oriented can be found in the leadership literature – sometimes labeled initiating structure versus consideration or production-centered versus employee-centered behaviors (see for example, Judge et al. 2004). While recent work suggests that successful leadership is a function of overlapping attention to task performance and the social needs of the group (e.g., Judge et al. 2004); meta-analysis of prior studies of gender and leadership found that men emerge as leaders in task-oriented situations and women emerge as leaders in socially-oriented situations (Eagly and Karau, 1991). Our findings may be best viewed as a first step in understanding how to use technology to produce a more balanced engagement in task- and socially-oriented leadership by men and women alike. From this perspective, we discuss our results.

Gender role theory (Eagly, 1987) suggests and recent meta-analysis (Eagly and Karau, 1991) supports gender differences in leader emergence in face-to-face teams. Contrary to these previous studies, our study shows that for our technology-mediated teams there is no significant difference between men and women in neither task-oriented nor socially-oriented leadership behaviors overall. However, the interaction term in the task-oriented analysis was significant and is illustrated in Figure 2. The pattern of results demonstrated shows women engaging in more task leadership than men later in the group’s life. In contrast, it is interesting to note that no differences in socially-oriented leadership were found between the men and women participants. These behaviors are portrayed graphically in Figure 2. While not statistically significant, men in our study actually engaged in more socially-oriented leadership than women in the first time period and then it drops to almost zero by the end of the study. In fact, if we compare the two graphs in Figure 2 we see that men engaged in more task and socially-oriented leadership early on but by the mid-point women were engaging in more of both.

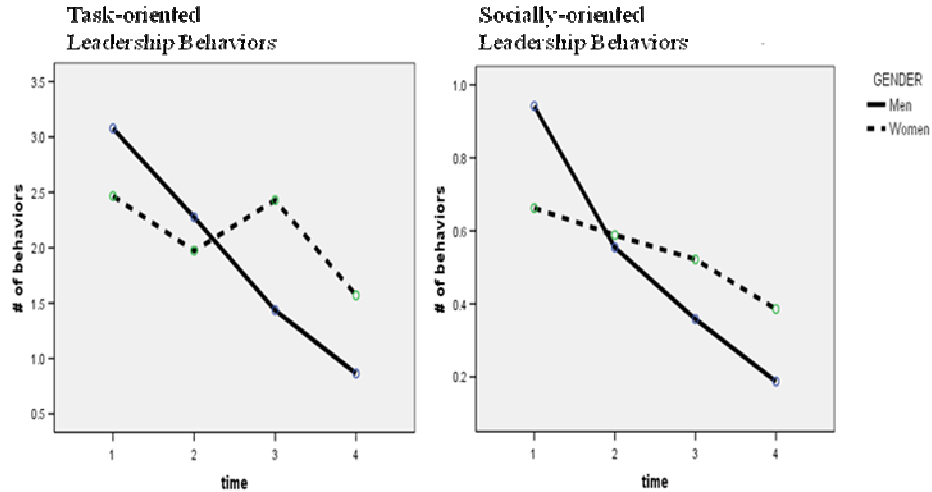


Figure 2: Gender and Time Interactions

Taken together the statistical results and graphs suggest not only was our null hypothesis (H1) confirmed; but the pattern of behaviors engaged in by the men and women in our study provide compelling support for equalizing effect of CT to provide a context within which potentially lower status group members can be heard albeit such participation takes some time to develop. Conversely our results may suggest a context within which high-status members grow silent. When these results were presented to the participants (one year after the experiment concluded) one of the male participants suggested the men may have been aware that their particular style of leadership did not translate easily into the virtual context and perhaps they attempted to communicate more in impromptu face-to-face encounters. Women did not express similar sentiments.

Recent research suggests that good managers understand how and when to intervene and facilitate technology adaptation in their teams (Thomas and Bostrom, 2010). Our results suggest one such intervention may be to make multiple channels of communication available and equally valid. Much of the existing work on CMC teams treats members of teams as homogeneous – at least in terms of what constitutes best practice use of collaborative technologies. Our results potentially suggest individual differences among team members could be a valuable driver of decision making about how and when individual team members (rather than whole teams) use technology capabilities over a team’s lifecycle. Developing such new understandings about the temporal patterning of individual use of collaborative technologies could help engage individuals within teams and provide new insights for practitioners and researchers alike interested in improving group participation which may lead to improvements in team well-being (i.e., cohesion, team identify) and has been linked to improved team performance (Carte et al. 2006).

We also found support for a second set of hypotheses focused on the interplay between behaviors and perceptions. In the investigation of perceived leadership, H2a and H2b, the interaction of gender and socially/task-oriented leadership, were supported. The significant interaction effects indicate that when our men and women engaged in role incongruent leadership behaviors (i.e., women in task-oriented behaviors and men in socially-oriented behaviors) this positive disconfirmation led to higher perceptions of them as leaders. These findings are consistent with the contrast perspective of ECT. Previous research argues women are expected to show more socially-oriented leadership behavior, while men are expected to show more task-oriented leadership behavior (Eagly and Johannesen-Schmidt, 2001). Thus when lower expectations were met with higher performance – when women engaged in task-oriented leadership behavior or men in socially-oriented leadership behavior – such role-incongruent leadership behaviors were more likely to stand out and be noticed by teammates, and they were more likely to be perceived as leaders. This provides some insights into the potential role of collaborative technologies. The women in our study who engaged in task leadership or men in social leadership could break out of their gender roles using technology and overcome ingrained gender-role perceptions.

Our results suggest the CMC context provides for emergent leadership outcomes that deviate from gender role theory – the men and women in our CMC context did not engage in significantly different leadership behaviors. More importantly, the CMC context helped to overcome gender stereotypes in perceptions: women who engaged in

task-oriented leadership behaviors were more likely to be seen as leaders than men who engaged in task leadership. Also, men who engaged in socially-oriented leadership behaviors were more likely to be perceived as leaders than women who engaged in the same. However, as time went by, gender differences in leadership perception disappeared in our CMC groups (see Table 6). This pattern of results extends the time-based argument from gender role theory into the CMC context and confirmed our hypothesis 3.

Finally, our data were collected in Sri Lanka, and leadership behaviors are expected to differ in societies with different cultural profiles. It is possible that culture has a stronger impact on leadership behavior than gender, and gender differences presented in the literature may be unique to North America (Van Emmerik et al., 2008). Sri Lankan culture has been characterized as high on power distance, high on uncertainty avoidance, collectivist and nurturing (Weathersby, 1993) – virtually the opposite of North America. Sri Lanka elected the world's first female Prime Minister – Sirimavo Bandaranaike in 1960. So, perhaps gender expectations are substantially different with women feeling more empowered in this culture compared to North America. However, a recent attempt to identify cultural differences in leadership behavior and gender suggests that South Asians are more likely to associate task-oriented leadership behaviors with male leaders – consistent with gender role theory, but no gender differences for socially-oriented leadership behaviors were found – inconsistent with gender role theory (Van Emmerik et al. 2008). Our participants did not engage in emergent leadership behaviors that were consistent with previous, largely North American-based theory (i.e., Gender Role Theory) however the timing of their behavior was consistent with such theory – the men in our study did engage in more leadership early on and women emerged as leaders later. They also expressed perceptions that were consistent with existing theory (i.e., ECT). Taken together our findings suggest our Sri Lankan participants are likely more similar to North American business professionals than different at least in terms of emergent leadership behaviors. More cross-cultural comparisons of gender and leader emergence are needed. Such studies should also attempt to capture gender-role expectations.

While not a central focus of our study, future research may want to focus on the role of personality in online emergent leadership. A recent meta-analysis of face-to-face teams found the Big 5 dimension extraversion most consistently correlated with leadership (Judge et al. 2002). Conscientiousness displayed the second strongest correlation with leadership. However, in our study, extroversion did not have a significant positive effect on leadership, but conscientiousness did. A possible explanation for this is the virtual working environment makes it harder for extroverted people to assert themselves, but the organizing activities of conscientious individuals allow them to quickly emerge as leaders.

Conclusions

Our findings suggest the introduction of computer-mediated communication into group interactions can provide women an opportunity to engage in assertive behaviors potentially outside of their gender role expectations. Previous research suggests that women are more likely to engage in less assertive, socially-oriented leadership while men engage in more assertive, task-oriented leadership at least partially due to gender role expectation associated with gender. In our study this was not the case. The women in our study engaged in both socially-oriented and task-oriented leadership behaviors at levels equivalent to their male counterparts; however when they engaged differed. Given the volume of previous studies linking leadership to positive team outcomes, including a need for task-oriented behaviors in virtual teams (Carte et al. 2006), we encourage future studies focused on the use of technology to encourage emergent leadership behaviors. However, these results may be idiosyncratic to our study's context – Sri Lanka. Hence, cross-cultural studies are needed.

Further, the women in our study were able to overcome potentially existing gender-role biases in the way they were perceived by their teammates. In fact, gender seemed to play a small role in comparison to actual behaviors when team members were identifying emergent leaders in their teams. Given the access to face-to-face interactions and the likely salience of gender in such interactions, this finding should be interpreted as great news for assembling mixed gender teams and leveraging inherent knowledge and abilities. Finally, time played a role in our outcomes. Leadership behaviors engaged in early by our participants had the greatest impacts on perceptions. One potential managerial prescription that may be derived from this is the early introduction of collaborative technologies. This is consistent with some existing work on diverse teams. Carte and Chidambaram (2004) articulate a theory of accelerated technology deployment that recommends early use of technology – including reductive features that provide a more visually anonymous context – for more diverse team. They argue that early anonymity can reduce (or at least delay) social categorization behaviors that create in group/out group categorizations based on surface traits (like gender). As such, more consistent use of collaborative technologies (rather than face-to-face meetings) may help create a more level playing field for both genders to engage in a more balanced set of leadership behaviors.

Especially for teams with long life expectancies, the dual focus on task and relationship development is important to team development (McGrath, 1991).

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